REMARKS

This Amendment is responsive to the Office Action mailed on August 8, 2005. Claims 1, 6, 8, 13, and 17 are amended. Claims 11, 12, and 14 are cancelled. Claims 1-10, 13, and 15-18 are pending.

Claims 6 is rejected under 35 U.S.C. § 112 as being indefinite. Claim 6 is amended herein to overcome the indefiniteness rejection. Withdrawal of this rejection is respectfully requested.

Claims 1, 3-7, 9 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Matsumoto (JP 2000152694).

Claims 1, 3-7 and 9-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Harris (US 2003/0000358) in view of Matsumoto.

Claims 2 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Harris and Matsumoto, in further view of Smith (US 2002/0007711).

Applicant respectfully traverses these rejections in view of the amended claims and the following comments.

Discussion of Amended Claims

Claim 1 is amended to include the subject matter of claims 12 and 14. Claims 11, 12 and 14 are cancelled to avoid duplication of claimed subject matter.

Claim 6 is amended to overcome the Examiner's rejection under 35 U.S.C. § 112.

Claims 8, 13 and 17 are amended to improve readability of the claim language.

Discussion of Matsumoto

Claims 1, 3-7, 9 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Matsumoto. This rejection is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d

1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Matsumoto does not meet the requirements for an anticipation rejection.

Amended claim 1 now includes the subject matter of claims 12 and 14. The Examiner did not reject claims 12 and 14 as being anticipated by Matsumoto, as the Examiner apparently acknowledges that Matsumoto does not disclose or remotely suggest a sawing machine having a first drive for a sawing tool and a second drive for a carriage, as set forth in amended claim 1. In fact, Matsumoto is not at all related to any type of sawing machine. Rather, Matsumoto relates to motor driving system for a stacking crane (paragraph 24 of the attached automated machine prepared English language translation of Matsumoto).

As Matsumoto does not disclose each and every element of the invention as claimed, the rejections under 35 U.S.C. § 102(b) are believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra.*

Discussion of Harris

Claims 1, 3-7 and 9-18 are rejected as being unpatentable in view of Harris and Matsumoto. The subject matter of claims 12 and 14 is now included in amended claim 1.

Harris discloses a material cutting apparatus having an adjustable shuttle stop apparatus. The cutting apparatus comprises a horizontally disposed feed conveyor 12 and a horizontally disposed receiving conveyor 14 (page 2, para. 0032). A shuttle vise 32 is mounted on the feed conveyor 12 and may be moved longitudinally therealong [page 2, para. 0035]. The shuttle vise 32 is driven by a drive mechanism. A prime mover 64 such a reversible electric motor, hydraulic motor etc. can be provided (page 3, para. 0038). A rotating band saw blade 92 is driven by a band saw driver 94 Page 3, para. 0045).

As acknowledged by the Examiner, Harris does not disclose or remotely suggest the provision of a common frequency converter for both the drive mechanism utilized to move the carrier (shuttle vise 32) and the drive mechanism utilized to move the sawing tool (band saw blade 92), as is claimed by Applicant in amended claims 1 and 17.

Amended claim 1 is drawn to a sawing machine comprising a sawing tool, a carriage, a plurality of drives, and a control unit. A first drive, which drives the sawing tool, and a second drive, which drives the carriage, are controlled in such a manner that they are not operable at the same time. The first drive and the second drive are coupled to a common frequency converter. Claim 17 is a method claim 1 that corresponds to the apparatus of claim 1.

Accordingly, with the present invention claimed, a sawing machine is provided which minimizes the number of frequency converters that are needed. The common frequency converter of the present invention is associated with both the sawing tool drive and the carriage drive. Cost savings are achieved since separate frequency converters for the drive and carriage are not required.

Furthermore, with the present invention, since a common frequency converter is used, the space needed in a switch box or switchgear cabinet of the sawing machine is reduced. The use of a common frequency converter also leads to a reduction in the number of heat sources in a switchgear cabinet of the sawing machine. Accordingly, the number of electronic interference sources in the switchgear cabinet is also reduced. Therefore, the sawing machine of the present invention is of more simple construction and is more trouble-free in operation (specification page 2, first two paras.).

With a sawing machine as claimed by Applicant, the sawing tool and the carriage (in particular for feeding of workpieces to the sawing tool) can be operated independently; the sawing tool and the feed carriage do not have to be moved together.

The Examiner states on page 3 of the Office Action that the first and second drives 64, 94 of Harris are not activated at the same time, and are operated at different times, relying on paragraphs 0002 and 0045 of Harris. The Examiner's conclusions in this regard appear to be based on hindsight impermissibly gained from Applicant's disclosure. Paragraphs 0002 and 0045 do not disclose or suggest anything about non-activation of the drives 64 and 94 at the same time or operation of the drives 64 and 94 at different times.

Accordingly, Harris does not disclose or remotely suggest a sawing machine having a first drive, which drives the sawing tool, and a second drive, which drives the carriage, where the two

drives are controlled in such a manner that they are not operable at the same time, as claimed by Applicants.

The Examiner relies on Matsumoto as disclosing a common frequency converter. Applicant's respectfully submit that Matsumoto does not cure the deficiencies of Harris noted above.

Matsumoto is not related at all to any type of sawing machine. In particular, Matsumoto as indicated at paragraph 0024 of the attached translation, is related to stacker crane equipment used for an automatic warehouse. Such a stacker crane is far removed from a sawing machine as claimed by Applicant.

Applicant respectfully submits that one skilled in the art of sawing machines would not consider Matsumoto when attempting to improve a sawing machine. Further, there is no motivation for one skilled in the art to combine the disclosures of Harris and Matsumoto as suggested by the Examiner. Harris is directed towards a sawing machine having an adjustable shuttle stop apparatus which compensates for undesired movement of the shuttle vise caused by clamping the workpiece (Abstract). Matsumoto is directed towards a motor driving system for a stacker crane used in an automated wharehouse which has a plurality of motors, which provides stability in operation where circuit constants may vary.

Further, assuming *arguendo* that one skilled in the art was somehow motivated to combine the dsiclosures of Harris and Matsumoto as suggested by the Examiner, they would still not arrive at Applicant's claimed invention, since neither Harris nor Matsumoto discloses or suggests a sawing machine having a first drive, which drives the sawing tool, and a second drive, which drives the carriage, where the two drives are controlled in such a manner that they are not operable at the same time, as claimed by Applicants.

Applicants respectfully submit that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Harris or Matsumoto, taken alone or in combination, or any of the other prior art of record.

Further remarks regarding the asserted relationship between Applicant's claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to

any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,

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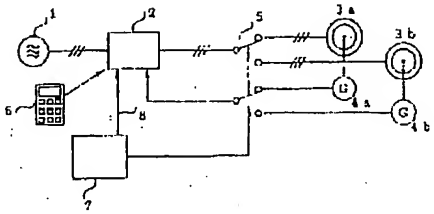
(54) **MOTOR-DRIVING SYSTEM**

(57) Abstract:

PROBLEM TO BE SOLVED: To achieve a stable operation even if a circuit constant is greatly different by setting a plurality of sets of circuit constants of different motors and switching the motors connected to an inverter corresponding to the change in the circuit constant.

SOLUTION: A plurality of motors 3a and 3b with different motor circuit constants are provided. In this case, the motor circuit constants are preset to a table in an inverter 2. A control circuit 7 outputs a switching command signal 8 to the inverter 2 and at the same time switches a switching circuit 5. When the motor 3a is being driven, the output part of the inverter 2 and the motor 3a are connected and also connection is made so that the output signal of a speed detector 4a can be fed back to the inverter 2 by the switching circuit 5. Then, when a switching command is outputted to the motor 3b, the switching circuit 5 performs switching connection of the output part of the inverter 2 to the motor 3b and also so that the output signal of the speed detector 4b can be fed back to the inverter 2.



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the inverter equipment which chooses two or more sets of the motors with which the motor drive system which used vector control inverter equipment is started, especially controlled parameters, such as a model according to an application, an output, and a pole, differ with one inverter equipment, and is operated, the control approach, the internal-constant setting approach, and a motor drive system.
[0002]
[Description of the Prior Art] In the motor drive system by the conventional vector control inverter, it doubled with the motor to drive and the motor circuit constant was set up from the operator, the digital control panel, etc. as an internal constant of an inverter. A setup of the motor circuit constant at this time was only one kind. For this reason, the inverter of the number of a motor and the same number which sets up an internal constant each time or is used needed to be prepared for the facility which drives two or more motors with which circuit constants differ.
[0003] An example of the control system which contains an inverter in drawing 8 is shown. Power is supplied to an inverter 2 according to a power source 1, and a motor 3 is driven. The engine speed of a motor 3 is fed back to an inverter 2 by the engine-speed detector 4.
[0004] When carrying out vector control of the motor, the motor circuit constant of the motor 3 shown in drawing 9 is set as an inverter 2, and it is used under the optimal combined condition. For this reason, the combination of an inverter and a motor was set to 1 to 1.
[0005] In vector control, when the motor circuit constant differed from the motor circuit constant (internal constant) set as the inverter, even if the inverter output capacitance was in several or more times larger relation to the motor output, there was a case where control became unstable and it even became impossible to put a motor into operation as well as the drive of a motor.
[0006]
[Problem(s) to be Solved by the Invention] Although that motor circuit constant was beforehand set up as an internal constant of an inverter to one set of a motor, when connecting the motor from which a motor circuit constant is different instead of the motor together put by these optimum conditions and operating, since motor circuit constants differ, it cannot drive to stability. Even starting might not be completed depending on the case. Therefore, when the motor to be used was changed, the internal constant of an inverter also needed to be changed according to the motor to be used.
[0007] The purpose of this invention is to enable it to operate to stability also by the motor from which a circuit constant differs sharply in the inverter control which carries out mutual operation by one set of an inverter, changing two or more sets of motors.

[0008]
[Means for Solving the Problem] In order to solve this problem, it has a means to prepare two or more storage regions of an internal constant for one set of an inverter, and to set up two or more sets of motor circuit constants of a different motor, and enabled it to change the internal constant set up further with automatic or hand control. Moreover, corresponding to modification of an internal constant, it had the change means which changes the motor connected to the inverter.
[0009] The group of two or more motor circuit constants set to one set of an inverter is changed by the internal-constant change means, and is alternatively changed to the motor corresponding to that internal constant corresponding to this change. By this change, the selected internal constant is in agreement so that it may become the motor and optimum conditions which were changed by corresponding, and a motor is driven to stability.
[0010]
[Embodiment of the Invention] As shown in drawing 1 , the case where mutual operation of the motors 3a and 3b with which motor circuit constants differ is carried out by one set of an inverter 2 is explained.
[0011] The input of an inverter 2 is connected to a power source 1, and power is supplied. Moreover, Motors 3a and 3b are connected to the output of an inverter through the motor change means 5. A control circuit 7 changes and controls the change circuit 5 while it consists of a sequencer or a sequential circuit and outputs the internal-constant command 8 to an inverter 2. The change circuit 5 changes the change of the power line of a motor, and the output signal of the rotational frequency detectors 4a and 4b. The engine speed of a motor is fed back to an inverter 2 by the engine-speed detectors 4a and 4b. Although an operator 6 is the operating set which can perform various inputs and a monitor, he becomes an input means to input the circuit constant of a motor into an inverter in the case of thi example.
[0012] The change of the internal constant of an inverter 2 is explained first.
[0013] The circuit constant of the motor set up as an internal constant of an inverter 2 is r1a, x1a, r2a, x2a, and .... which are shown in drawing 2 and drawing 3 . These constants use an operator 6 for the table within the storage means of the inverter 2 beforehand shown in drawing 3 , and the motor circuit constant of motor 3b is set to the motor circuit constant of motor 3a, and Table b by said table a. Although you may make it set up these constants separately, make the usable motor circuit constant of a motor correspond to the model of motor, an output, and a pole from inverter capacity, and it is made to memorize as a standard internal constant of an inverter in the storage means of two or more set inverter, and a setup from an operator sets up the model of motor to be used, an output, and a pole, and a motor circuit constant may be made to be set as a table automatically. If it does in this way, it will become possible for it to become unnecessary to set up th circuit constant of said motor altogether one by one, and to set it up certainly and simply moreover.
[0014] And the change of the table a or b memorized with the change command signal 8 from the outside by the storage means with which the inverter 2 was equipped is performed like the flow chart of drawing 4 .
[0015] Namely, 1. It checks that a required-number setup of the motor circuit constant is carried out (step 1).
2. Judge whether the above-mentioned circuit constant is still more rational (step 2).
3. Carry out the alarm display of that by which abnormalities were discovered above (step 3).
4. Change to a degree and choose the table containing the circuit constant to be used by ON/OFF of a command signal (step 4).
5. If a change command signal is OFF, Table a (step 5) will be used.
6. If a change command signal is ON, Table b (step 6) will be used. (Whichever is sufficient as the priority of the 5th term and the 6th term.)
7. Perform inverter control using this circuit constant (step 7). ** -- it performs like.
[0016] Next, the connection change of a motor and a rotational frequency detector is explained.
[0017] The control circuit 7 which controls this system is constituted by a sequencer or the sequential circuit, and it changes an electronic switch 5 at the same tim it outputs the change command signal 8 to an inverter 2. For example, when changing from the condition of having driven motor 3a to motor 3b, it connects so tha

motor 3a may be connected with the output section of an inverter by the electronic switch 5 and the output signal of engine-speed detector 4a may be fed back to an inverter 2 at first. And if it changes so that motor 3b may be driven, and a command is emitted, it will change and an electronic switch 5 will be connected so that the output section of an inverter may be changed to motor 3b, and it may connect and the output signal of engine-speed detector 4b may be fed back to an inverter 2. Consequently, power can be supplied now to motor 3b, and it becomes possible to feed back the engine speed of motor 3b to an inverter 2 by engine-speed detector 4b. Of course, at this time, the internal constant of an inverter has changed to the table b corresponding to motor 3b, as stated previously, and the relation between a motor and an inverter is in agreement.

[0018] When changing from the condition of having driven motor 3b to motor 3a, it can carry out similarly.

[0019] Manual change ****** besides automatic-switching ****** is also possible for a change by the electronic switch 5.

[0020] According to this example, a software-based internal-constant change and the connection change of a hard motor and a rotational frequency detector are mostly performed to coincidence as mentioned above. Therefore, since the motor circuit constant of said motors 3a or 3b and the internal constant of the inverter o said inverter 2 are always in agreement, it can operate to stability. And by the ability setting up and choosing each motor circuit constant to drive, it is effective in the utilization factor and user-friendliness of operation effectiveness, a motor, and an inverter improving.

[0021] Moreover, from an operator 6, the motor circuit constant of two or more sets of the motors according to a specification can be set up easily.

[0022] Moreover, the motor of the capacity which is in the range where the set-up circuit constant is realistic, or was seen and set up from the output capacitance of an inverter can actually drive, or judges the rationality of **, and can prevent a setting error by emitting warning, when unusual. It is possible to display a comment with use [lack of inverter capacity], [improper] on an operator's digital display section as an error message, when inverter capacity is still smaller than the capacity of a motor, and to call attention.

[0023] In addition, although the inverter of the sensor loess vector control method which does not need an engine-speed detector is put in practical use, the engine-speed detectors 4a and 4b can be omitted in this case, and the change to which the change circuit 5 corresponds can be omitted.

[0024] As a concrete example, the case where it applies to the stacker crane equipment used for an automatic warehouse etc. is explained here.

[0025] A stacker crane is used for performing carrying in of a load and taking out on the shelf directed to arbitration, and generally it consists of a motor a for rise and fall, a motor b for a fork, and a motor c for transit as shown in drawing 5 .

[0026] In order that the motor b for a fork may collide with the column of a shelf during actuation, the motor a for rise and fall and the motor c for transit are not operated.

[0027] Therefore, in this example, in order not to carry out parallel running of the motor a for rise and fall, and the motor b for a fork, an inverter may use the same article.

[0028] Each operation and a busy condition are shown in the operation pattern of drawing 6 . This is an example in the case of carrying in the load of drawing 5 to the 3rd step. In an operating range P1, the motor change command signal 8 is set to OFF, and Motor a performs rise-and-fall operation. In an operating range P2, in order to use Motor b, the change command signal 8 is set to ON, the table used for control is used as Table b, and fork appearance is operated. In an operating range P3, in order to take down a load to a shelf, low-speed descent is carried out by Motor a. In this case, in order to use Table b, the change command signal 8 is set to OFF. In the last range P4, since it is necessary to return a fork, the change command signal 8 is set to ON, and fork actuation is performed. This the actuation of a series of is repeated as some patterns, and is used.

[0029] Although said two kinds of tables are changed and it was made to change with a command signal in the above example, selection operation of two or more sets of motors is possible by increasing the increase of the number of tables, the change command (selection) signal 8, and the number of circuits of an electronic switch 5.

[0030] Moreover, by using a control system, the change drive of each motor is possible in any sequence by the operation pattern Fig.

[0031] Moreover, in the function of inverter equipment, it has the function of electrical-potential-difference-frequency control (control system which outputs and controls the ratio of output voltage and an output frequency by a certain functional relation) other than said vector control. For this reason, it is also possible to use said vector control and electrical-potential-difference-frequency control by turns further according to an application as shown in drawing 7 . In this case, since it can think almost like drawing 4 , explanation here is omitted.
[0032] If it does in this way, by the torque characteristic of a load machine, selection of vector control or electrical-potential-difference-frequency control is possible, and the variation of a selection of function can be extended further.
[0033] According to the above example, there is effectiveness which can miniaturize tooth spaces, such as a control panel, by the ability driving the motor from which two or more sets of motor circuit constants differ by one set of an inverter.
[0034]
[Effect of the Invention] According to this invention, by one set of an inverter, the motor with which two or more sets of motor circuit constants differ is changed, it connects, and there is effectiveness which can be operated to stability.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the drive system configuration Fig. (one-pair many control) showing one example of this invention.
[Drawing 2] It is drawing which was shown in the example of drawing 1 and in which having shown an example of the equal circuit of each motor.
[Drawing 3] It is drawing which was shown in the example of drawing 1 and in which showing the contents of storage in an inverter.
[Drawing 4] It is drawing by this invention showing one example of an inverter internal-processing flow chart.
[Drawing 5] It is drawing showing other one concrete example of this invention.
[Drawing 6] It is drawing having shown an example of an operation pattern Fig. at the time of carrying in shown in the example of drawing 5 .
[Drawing 7] It is drawing by this invention showing other one example of an inverter internal-processing flow chart.
[Drawing 8] The conventional drive system configuration Fig. is shown. (1 to 1 control)
[Drawing 9] It is drawing which was shown in the example of drawing 8 and in which having shown an example of the equal circuit of a motor.
[Explanation of a cable address]
1 [-- A motor, 3b / -- Motor,] -- A power source, 2 -- An inverter, 3 -- A motor, 3a 4a [-- Operator,] -- A rotational frequency detector, 4b -- A rotational frequency detector, 5 -- An electronic switch, 6 7 [-- Primary resistance,] -- A control circuit, 8 -- A change command signal, r -- Primary resistance, r1a r1b -- Primary resistance, x--primary leakage reactance, x1 a--primary leakage reactance, x1 b--primary leakage reactance, r -- Secondary resistance, r2a -- Secondary resistance, r2b -- Secondary resistance, x -- Secondary leakage reactance, x2a -- Secondary leakage reactance, x2b [-- An exciting conductance, b / -- An exciting susceptance, ba / -- An exciting susceptance, bb / -- Exciting susceptance] -- Secondary leakage reactance, g -- An exciting conductance, ga -- An exciting conductance, gb

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[Translation done.]

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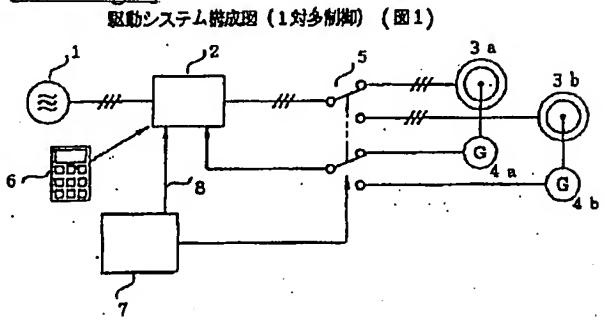
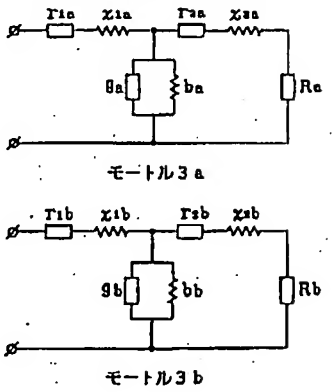
DRAWINGS

[Drawing 1]



[Drawing 2]

各モートルの等価回路図　（図2）



モートル3a

モートル3b

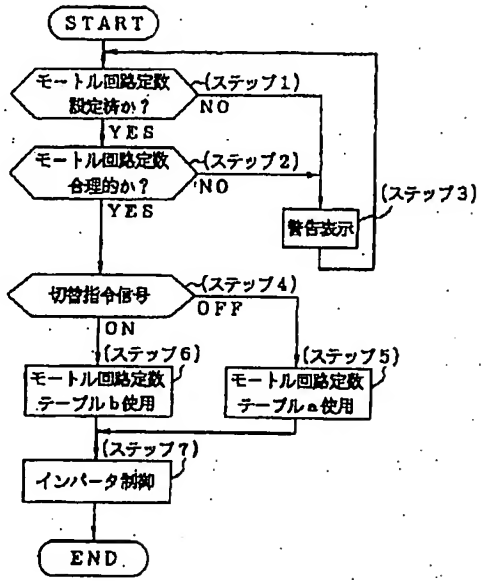
[Drawing 3]

インバータ内の記憶内容　（図3）

テーブルNo. / 項目	テーブルa モートル3a用	テーブルb モートル3a用
一次抵抗	r1a	r1b
一次漏れリアクタンス	x1a	x1b
二次抵抗	r2a	r2b
二次漏れリアクタンス	x2a	x2b
励磁コンダクタンス	ga	gb
励磁サセプタンス	ba	bb
励磁電流	Ioa	Iob
など		

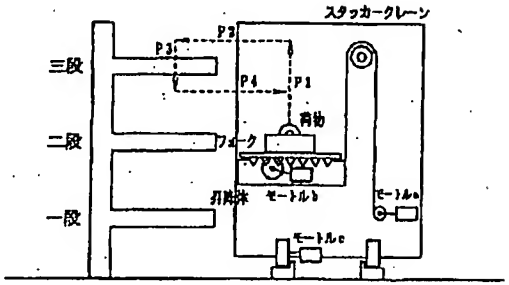
[Drawing 4]

インバータ内部のフローチャート　(図4)



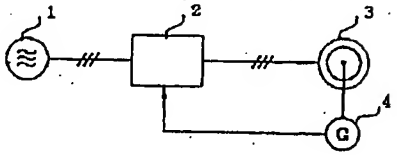
[Drawing 5]

具体的な実施例　(図5)



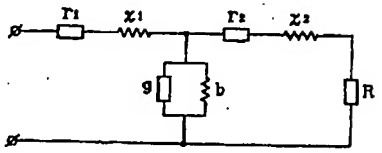
[Drawing 8]

従来の駆動システム構成図（1対1制御）　（図8）



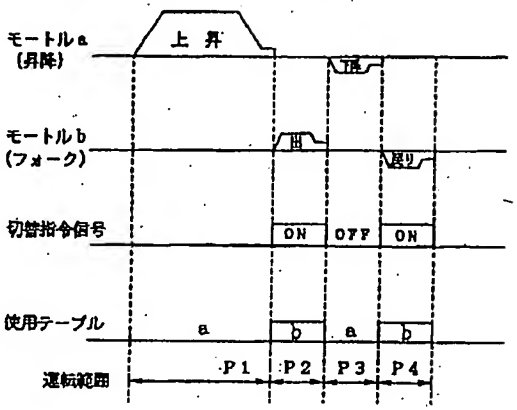
[Drawing 9]

モートルの等価回路　（図9）



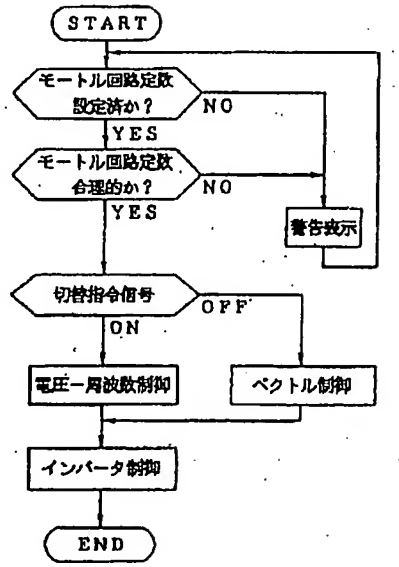
[Drawing 6]

搬入時運転パターン例　（図6）



[Drawing 7]

インバータ内部のフローチャート　(図7)
(ベクトル制御と電圧一周波数制御の切り替え)



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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The motor driving means which drives two or more motors by which were connected to AC power supply and change connection was made through the motor change means at the output section by vector control, A setting means to set two or more motor circuit constants as said motor driving means, It has the motor circuit constant change means which changes two or more motor circuit constants set up in said motor driving means. Said motor change means and said motor circuit constant change means The motor drive system characterized by changing so that said motor circuit constant may correspond to said motor by which change connection was made.
[Claim 2] The inverter equipment which drives the motor for rise and fall, the motor for transit, said motor for rise and fall by which was connected to AC power supply and change connection was made through the motor change means at the output section, and said motor for transit by vector control, A storage means to store the motor circuit constant corresponding to said motor for transit, and said motor for transit in said inverter equipment, In case said motor for rise and fall is operated, change said inverter and said motor for rise and fall with said motor change means, and connect, and it changes and connects with the motor circuit constant corresponding to said motor for rise and fall with a motor circuit constant change means. Said motor for transit It is the motor drive system characterized by having the control means which changes said inverter and said motor for transit with said motor change means, and connects, and is changed and connected to the motor circuit constant corresponding to said motor for transit with a motor circuit constant change means in case it operates.
[Claim 3] In the inverter equipment which drives two or more motors by which were connected to AC power supply and change connection was made through the motor change means at the output section The control means which changes the motor driven by vector control among two or more motors connected to said inverter equipment, and the motor driven by electrical-potential-difference-frequency control, and is connected and to control, Change the motor circuit constant memorized inside inverter equipment when the motor which should be driven by vector control was connected so that it may correspond to this motor, and it drives by vector control. It is the motor drive system characterized by driving this motor by electrical-potential-difference-frequency control when the motor which should be driven by electrical-potential-difference-frequency control is connected.
[Claim 4] It is the motor drive system which carries out [having the motor circuit constant change means which changes two or more motor circuit constants set as the interior of the inverter equipment which drives two or more motors by which were connected to AC power supply and change connection was made through the motor change means at the output section by vector control, and said inverter equipment, and changing said motor change means and said motor circuit constant change means so that said motor circuit constant may correspond to said motor by which change connection was made, and] as the description.
